APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,069	06/30/2006	Christine Robert-Coutant	034299-647	2632

46188   7590   06/24/2008
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EXAMINER
CORBETT, JOHN M

ART UNIT	PAPER NUMBER
2882	

MAIL DATE	DELIVERY MODE
06/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 June 2006</u>.
2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-6</u> is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>1-6</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>25 June 2005</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☒ All b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>30 June 2006</u>.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis

for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
> sale in this country, more than one year prior to the date of application for patent in the United States.

1.   Claims 1-2 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Solomon et

al. (US 6,181,764 B1).

        With respect to claim 1, Solomon et al. discloses a method for reconstructing a

radiographic image (Col. 10, line 66 – Col 11, line 10) of an object (100) crossed by a diverging

radiation (135) undergoing an attenuation (Col. 3, line 63 – Col. 4, line 1), the radiation

occupying successive positions having overlapping portions and the attenuation being measured

by a network of detectors (Figures 3-4 and 6), on which the radiation projects and giving

vignettes of the image respectively associated with the positions of the radiation and also

comprising overlapping portions (Col , lines 30-62), the method comprising a combination of

vignettes for reconstructing the image (Col. 7, lines 33-45 and Col. 10, line 66 – Col. 11, line

10), as well as the following steps:

        - discretising the object into voxels defining reconstruction heights (Col. 9, lines 12-24

and Figure 6),

        - associating the voxels with at least one detector respective of the network on which the

radiation projects after having crossed said volume (Col. 9, lines 39-65 and Figure 6),

        - allocating an attenuation value to each voxel according to the values measured by said

associated detector (Col. 9, line 39 – Col. 10, line 38), and

        - combining the attenuation values of the voxels at the different reconstruction heights to

obtain a two dimensional image (Col. 10, line 66 – Col. 11, line 10).

        With respect to claim 2, Solomon et al. further discloses the attenuation value attributed

to each volume is equal to the sum of the values measured by said associated detector, divided by

the number of vignettes that contribute to giving said associated detector, and the attenuation

values of the voxels are combined by a digital combination on the groups of voxels

superimposed at the different reconstruction heights (Col. 10, lines 22-51 and Col. 10, line 66 -

Col. 11, line 10, also see Moorman et al. (US 5644612) which is incorporated by reference where

digital processing is used).

        With respect to claim 4, Solomon et al. further discloses the attenuation values of the

volumes are digitally combined on the groups of volumes superimposed at the different

reconstruction heights (Col. 10, lines 22-51 and Col. 10, line 66 - Col. 11, line 10, also see

Moorman et al. (US 5644612) which is incorporated by reference where digital processing used).

                              Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

        (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
        section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
        such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
manner in which the invention was made.

2.   Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Solomon

et al. as applied to claim 1 above, and further in view of Bleuet et al. ("An Adapted Fan

Sampling Scheme for 3-D Algebraic Reconstruction in Linear Tomosynthesis", October 2002,

IEEE Transactions on Nuclear Science, Volume 49, Number 5, Pages 2366-2372).

With respect to claim 3, Solomon et al. discloses a method as recited above.

Solomon et al. fails to disclose iterative projection of attenuation values measured by the

detectors, provisional values being allocated to the voxels and corrected after having been

projected on the detectors, in calculating the differences between the sums of provisional values

on the projection lines and the values measured by the detectors on said projection lines, and by

projecting the differences on said projection lines to correct the provisional values.

Bleuet et al. discloses iterative projection of attenuation values measured by the detectors

(Abstract and Page 2367, Col. 2, lines 10-32), provisional values being allocated to the voxels

and corrected after having been projected on the detectors, in calculating the differences between

the sums of provisional values on the projection lines and the values measured by the detectors

on said projection lines, and by projecting the differences on said projection lines to correct the

provisional values (Page 2367, Col. 2, line 10 - Page 2368, Col. 1, line 3).

It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the method of Solomon et al. to include the iterative technique of Bleuet et

al., since a person would have been motivated to make such a modification to improve imaging

by reducing reconstruction artifacts and by introducing *a priori* knowledge to stabilize the

reconstruction process in the presence of noise using a method in which specific and robust

mathematical knowledge has been developed to solve such an ill-posed inverse problems (Page

2367, Col. 1, line 31 - Col. 2, line 9) as taught by Bleuet et al.

    With respect to claim 6, Solomon et al. further discloses attenuation values of the

volumes are digitally combined on the groups of volumes superimposed at the different

reconstruction heights (Col. 10, lines 22-51 and Col. 10, line 66 - Col. 11, line 10, also see

Moorman et al. (US 5644612) which is incorporated by reference where digital processing used).

3.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Solomon et al. as

applied to claim 1 above, and further in view of Wilson et al. (US 2001/0048732 A1).

    With respect to claim 5, Solomon et al. discloses the method as recited above. Solomon et

al. fails to disclose osteodensitometry.

    Wilson et al. teaches osteodensitometry (Paragraph 25).

    It would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify the method of Solomon et al. to include the feature of Wilson et al., since a

person would have been motivated to make such a modification to improve patient health by

providing information used in determining a diagnosis of osteoporosis (Paragraph 25) as implied

by Wilson et al.

Conclusion

4.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Moorman et al. (US 5,644,612) which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Moorman et al. (US 5,859,893) which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Elliot et al. (US 6,198,802 B1) corresponding to application number 09/167,399 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Solomon et al. (US 6,234,671 B1) corresponding to application number 09/167,524 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Hansen et al. (US 6,118,853) corresponding to application number 09/167,523 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Solomon et al. (US 6,183,139 B1) corresponding to application number 09/167,405 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Solomon et al. (US 6,157,703) corresponding to application number 09/167,639 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Melen (US 6,208,709 B1) corresponding to application number 09/167,397 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Melen et al. (US 6,175,611 B1) corresponding to application number 09/167,318 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Solomon et al. (US 6,178,223 B1) corresponding to application number 09/167,171 which is incorporated by reference in Solomon et al. (US 6,181,764 B1).

Lee et al. (US 5,166,524) which is incorporated by reference in Wilson et al. (US 2001/0048732 A1).

Gershman et al. (US 5,838,765) which is incorporated by reference in Wilson et al. (US 2001/0048732 A1).

Steiger et al. (US 5,850,836) which is incorporated by reference in Wilson et al. (US 2001/0048732 A1).

Gowin et al. ("Acronyms in Osteodensitometry", Summer 1998, Journal of Clinical Densitometry, Volume 1, Number 2, Pages 137-139) discloses that Osteodensitometry is the most important radiological Instrumentarium for the diagnosis of osteoporosis (Page 137, Col. 1, lines 2-7).

Heumann (US 2004/0022348 A1) discloses an iterative reconstruction apparatus and method where the error is computed between the acquired and predicted projections in a tomosynthesis/laminography system (Paragraphs 36 and 42 and Figure 3).

Heumann (US 6,002,739) discloses an apparatus and method for performing iterative reconstruction in tomosynthesis (Col. 4, lines 41-67, Col. 5, line 27 – Col. 6, line 18, Col. 8, line 60 – Col. 9, line 14 and Figure 2).

Guillemund et al. (US 2005/0078862) discloses an apparatus and method for performing iterative reconstruction in tomosynthesis (Title and Paragraph 35).

Chlewicki ("3D Simultaneous Algebraic Reconstruction Technique for Cone-Beam Projections", 2001, Masters of Science Thesis, University of Patras, Pages 1-57) discloses the

application of simultaneous algebraic reconstruction technique (SART) to a helical computed

tomography trajectory and indicating an obvious to try rational to apply SART to tomosynthesis

(Page 28, Section 3.4, Figure 3.1 and Page 39, lines 7-8).

Nambu et al. (US 6,196,715 B1) discloses tomographic acquisition geometries to include

a source that move in a circular trajectory with either a stationary detector or with a detector that

moves in a complementary circular trajectory where the source and detector trajectories are

limited to two different parallel planes (Figures 10, 11, 18B, 22, 48A, 49A-D and 55).

Matsuo et al. ("Three-Dimensional Image Reconstruction by Digital Tomo-Synthesis

Using Inverse Filtering", June 1993, IEEE Transactions on Medical Imaging, Volume 12,

Number 2, Pages 307-313) discloses a tomographic acquisition geometry in which a source

moves in a circular trajectory with a complementary circular trajectory of detector where the

source and detector trajectories are limited to two different parallel planes to obtain data to

reconstruct a 3-D space (Figures 1 and 2).

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to JOHN M. CORBETT whose telephone number is (571)272-8284.

The examiner can normally be reached on M-F 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

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like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. C./
Examiner, Art Unit 2882

/Chih-Cheng Glen Kao/
Primary Examiner, Art Unit 2882